A1 cont electricity is induced on the dielectric block by voltage applied to the chucking electrodes, thereby chucking the object.

Delete paragraph 0007, and add, as follows:

A2 [0007] On the other hand, the heat-exchange gas is introduced into the concave from the outlet of the gas-introduction channel, which is provided on the bottom of the concave. The heat-exchange gas diffuses along directions parallel to the chucking surface, filling the concave. To fill the concave with the heat-exchange gas uniformly, conductance of the heat-exchange gas along the diffusion directions needs to be high enough. However, when the concave is shallower, the conductance of the heat-exchange gas may decrease. Therefore, the heat-exchange gas cannot diffuse uniformly, resulting in that pressure in the concave becomes out of uniform along the directions parallel to the chucking surface. This leads to non-uniformity of temperature of the object along those directions. This often means, in the surface processing apparatuses, that the process of the object becomes out of uniform.

Delete paragraph 0011, and add, as follows:

A3 [0011] Fig. 1 is a front cross-sectional view schematically showing an electro-static mechanism of the embodiment of the invention.

Fig. 2 is a plan view of the ESC stage 2 shown in Fig.1.

Fig. 3 is a side cross-sectional view taken along line 3-3 shown in Fig. 2, explaining the concave-convex configuration on the chucking surface of the ESC stage 2.

Fig. 4 is a side cross-sectional view taken along line 4-4 in Fig. 2, explaining the concave-convex configuration on the chucking surface of the ESC stage 2.

Fig. 5 is a side cross-sectional view taken along line 5-5 in Fig. 2, explaining the concave-convex configuration on the chucking surface of the ESC stage 2.

Fig. 6 is a schematic plan cross-sectional view explaining the configuration of the cooling cavity 200 within the main body 21.

Fig. 7 is a schematic front cross-sectional view of a surface processing apparatus of the embodiment of the invention.

Delete paragraphs 0014-0016, and add, as follows:

[0014] The main body is made of metal such as stainless steel or aluminum. The dielectric block is made of dielectric such as alumina. A sheet 29 made of eutectic alloy including indium, or low-melting-point metal or alloy is inserted between the main body 21 and the dielectric block 22. The sheet 29 is to enhance heat transfer by filling the gap between the main body 21 and the dielectric block 22. The chucking electrodes 23,23 are boards provided in parallel to the chucking surface. It is preferable that configuration and arrangement of the chucking electrodes 23,23 are symmetrically coaxial with the center of the ESC stage 2.

A4

[0015] What characterizes this embodiment is in configuration of the chucking surface of the ESC stage 2. This point is described using Fig.1 to Fig.5 as follows. Though the chucking surface of the ESC stage 2 appears flat in Fig.1, actually it has concave-convex configuration. Fig.2 shows a plan view of this configuration. Fig.3, Fig.4 and Fig.5 show a side cross-sectional configuration of the chucking surface in detail. Fig.3 is the cross-section on 3-3 shown in Fig.2. Fig.4 is the cross-section on 4-4 shown in Fig.2. Fig.5 is the cross-section on 5-5 shown in Fig.2. The upper surface of the dielectric block 22 corresponds to the chucking surface. As shown in Fig.1, the dielectric block 22 protrudes upward as a whole. The object 9 is chucked on the top of the protrusion. Therefore, the top surface of the protrusion is the chucking surface.

[0016] As shown in Fig.2, the plan view of the chucking surface is circular as a whole. The object 9 is circular as well, having nearly the same radius as the chucking surface. The dielectric block 22 has a circumferential convex 24 along the outline of the circular chucking surface. The convex 24 is hereinafter called "marginal convex". Inside the marginal convex 24, many small column-shaped convexes 25 are formed. Each of the convexes 25 is hereinafter simply called "column convex". As shown in Fig.3, the top surface of the marginal convex 24 and the top surface of each column convex 25 are the same in height. When chucked, the object 9 is in contact with both of the top surfaces. Therefore, in this embodiment, the chucking surface is composed of the top surface of

A4 cont

the marginal convex 24 and the top surface of each column convex 25. When the object 9 is chucked, the concave 26 formed of the marginal convex 24 and the column convexes 25 is shut by the object 9.

Delete paragraph 0019, and add, as follows:

A5

[0019] As shown Fig.3 to Fig.5, the gas-diffusion concave 27 is deeper than the heat-exchange concave 26. A gas-introduction channel 20 is provided at the position where its outlet is at the bottom of the gas-diffusion concave 27. The gas-introduction channel 20 is lengthened perpendicularly to the chucking surface. In this embodiment, the gas-introduction channel is split into four, having four outlets. As shown in Fig.2, the four outlets are located at every 90 degrees on the second outer circumferential part 272. As understood from Fig.2 and Fig.4, the diameter of the outlet of the gas-introduction channel is a little larger than the width of the gas-diffusion concave 27.

Delete paragraphs 0028 and 0029, and add, as follows:

A6

[0028] Prudent consideration is necessary for amount area of the top surfaces of the marginal convex 24 and the column convexes 25 with respect to obtaining sufficient chucking force. Area of the object 9 in contact with the ESC stage 2 when chucked is hereinafter called "contact area". The whole surface area of the object 9 facing the ESC stage 2 is hereinafter called "whole facing area". The ratio of the contact area to the facing area is hereinafter called "area ratio". Generally speaking, the area ratio is preferably 3 to 20 %. In this embodiment, when the top surface area of the marginal convex 24 is S1, the top surface area of each column convex is S2, the whole facing area is S3, and the number of the column convexes 25 is n, then the area ratio R, which is

$$R=\{(S1+S2\cdot n)/S3\}\cdot 100,$$

would be preferably 3 to 20 %.

[0029] If the area ratio R is small, the whole chucking force becomes week because the surface area on which charges are induced is reduced. If the area ratio is below 3% in case that pressure in the heat-exchange concave 26 is increased for the good heat-

exchange, it is required to chuck the object 9 with very high voltage, which is unpractical and difficult. On the other hand, if the area ratio R is increased over 20%, the heat-exchange concave 26 is made too small, losing the effect of the heat-exchange efficiency improvement by the high-pressure heat-exchange concave 26.

A6 cont

Delete paragraph 0031, and add, as follows:

A7

[0031] Contrarily, if the cross-sectional area S4 is made too small, it is impossible to obtain the effect of the gas-introduction uniformity by increasing the conductance. Generally, conductance of gas is proportional to area of cross section perpendicular to diffusion direction. In this embodiment, the smaller cross-sectional area S4 means that width of the gas-diffusion path is made narrow, resulting in that the conductance is reduced. Considering this point, the cross-sectional area S4 is preferably 5% or more against the whole area of the chucking surface. If S4 is over 30% against the whole area of the chucking surface, the heat-exchange efficiency may decrease too much, because it means the area of the heat-exchange concave 26 is made too small relatively. Therefore, S4 is preferably 30% or less against the whole area of the chucking surface. When S5 is a bottom area of the heat-exchange concave 26, the whole area S of the chucking surface is;

$S=S1+S2\cdot n+S4+S5=S3$

Delete paragraph 0033, and add, as follows:

A8

[0033] In the described operation of the ESC mechanism, the heat-exchange gas is preferably confined within the concaves 26, 27. If the heat-exchange gas is not confined, it means that the object 9 floats up from the chucking surface by pressure of the heat-exchange gas. If such the float-up takes place, chuck of the object 9 becomes unstable. Additionally, the heat-exchange efficiency is made worse because heat contact of the ESC stage 2 and the object 9 becomes insufficient. Therefore, it is preferable to introduce the heat exchange gas to a point it does not leak out of the concaves